PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY
(Chapter II of the Patent Cooperation Treaty)

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference P06496PC00	**FOR FURTHER ACTION** See Form PCT/IPEA/416	
International application No. PCT/SE2004/000144	International filing date *(day/month/year)* 04-02-2004	Priority date *(day/month/year)* 22-12-2003
International Patent Classification (IPC) or national classification and IPC See Supplemental Box		
Applicant Telefonaktiebolaget L M Ericsson (publ) et al		

1. This report is the international preliminary examination report, established by this International Preliminary Examining Authority under Article 35 and transmitted to the applicant according to Article 36.
2. This REPORT consists of a total of 4 sheets, including this cover sheet.
3. This report is also accompanied by ANNEXES, comprising:
   a. ☒ *(sent to the applicant and to the International Bureau)* a total of 5 sheets, as follows:
      ☒ sheets of the description, claims and/or drawings which have been amended and are the basis of this report and/or sheets containing rectifications authorized by this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions).
      ☐ sheets which supersede earlier sheets, but which this Authority considers contain an amendment that goes beyond the disclosure in the international application as filed, as indicated in item 4 of Box No. I and the Supplemental Box.
   b. ☐ *(sent to the International Bureau only)* a total of (indicate type and number of electronic carrier(s))
      _____, containing a sequence listing and/or tables related thereto, in electronic form only, as indicated in the Supplemental Box Relating to Sequence Listing (see Section 802 of the Administrative Instructions).
4. This report contains indications relating to the following items:
   - ☒ Box No. I Basis of the report
   - ☐ Box No. II Priority
   - ☐ Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
   - ☐ Box No. IV Lack of unity of invention
   - ☒ Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
   - ☐ Box No. VI Certain documents cited
   - ☐ Box No. VII Certain defects in the international application
   - ☐ Box No. VIII Certain observations on the international application

Date of submission of the demand 21-04-2005	Date of completion of this report 07-04-2006
Name and mailing address of the IPEA/SE Patent- och registreringsverket Box 5055 S-102 42 STOCKHOLM Facsimile No. +46 8 667 72 88	Authorized officer Åsa Rydenius/EK Telephone No. +46 8 782 25 00

Supplemental Box

In case **the space in any of the preceding boxes is not sufficient.**
Continuation of: Cover sheet

International patent classification (IPC)
H04B 7/02 (2006.01)

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

International application No.
PCT/SE2004/000144

Box No. I Basis of the report

1. With regard to the **language**, this report is based on:

☒ the international application in the language in which it was filed

☐ a translation of the international application into _____, which is the language of a translation furnished for the purposes of:

- ☐ international search (Rules 12.3(a) and 23.1(b))
- ☐ publication of the international application (Rule 12.4(a))
- ☐ international preliminary examination (Rules 55.2(a) and/or 55.3(a))

2. With regard to the **elements** of the international application, this report is based on *(replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report):*

☐ the international application as originally filed/furnished

☒ the description:

pages 1-49 as originally filed/furnished
pages* _____ received by this Authority on _____
pages* _____ received by this Authority on _____

☒ the claims:

pages _____ as originally filed/furnished
pages* _____ as amended (together with any statement) under Article 19
pages* 1-5 received by this Authority on 02-12-2005
pages* _____ received by this Authority on _____

☒ the drawings:

pages 1-11 as originally filed/furnished
pages* _____ received by this Authority on _____
pages* _____ received by this Authority on _____

☐ a sequence listing and/or any related table(s) – see Supplemental Box Relating to Sequence Listing.

3. ☐ The amendments have resulted in the cancellation of:

- ☐ the description, pages _____
- ☐ the claims, Nos. _____
- ☐ the drawings, sheets/figs _____
- ☐ the sequence listing *(specify)*: _____
- ☐ any table(s) related to the sequence listing *(specify)*: _____

4. ☐ This report has been established as if (some of) the amendments annexed to this report and listed below had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).

- ☐ the description, pages _____
- ☐ the claims, Nos. _____
- ☐ the drawings, sheets/figs _____
- ☐ the sequence listing *(specify)*: _____
- ☐ any table(s) related to the sequence listing *(specify)*: _____

* *If item 4 applies, some or all of those sheets may be marked "superseded."*

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

International application No.
PCT/SE2004/000144

Box No. V **Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**

1. Statement

Novelty (N)	Claims	1-36	YES
	Claims		NO
Inventive step (IS)	Claims	1-36	YES
	Claims		NO
Industrial applicability (IA)	Claims	1-36	YES
	Claims		NO

2. Citations and explanations (Rule 70.7)

Documents cited in the International Search Report:
D1: 3GPP TS 25.402 V5.2.0
D2: WO03096733 A
D3: WO0141482 A
D4: WO0247424 A

The cited documents represent the general state of the art.
The invention defined in claims 1-36 is not disclosed by any of these documents.
The cited prior art does not give any indication that would lead a person skilled in the art to the claimed DHO node and method of a search window strategy in diversity handover.
Therefore, the claimed invention is not obvious to a person skilled in the art.
Accordingly, the invention defined in claims 1-36 is novel and is considered to involve an inventive step. The invention is industrially applicable.

CLAIMS

1. A Diversity Handover, DHO, node adapted to execute a macro diversity functionality in a mobile telecommunication system **characterised in** that said DHO node comprises means for performing an uplink combining of Dedicated Channel, DCH, frames, means for estimating the size of an adaptive receive window for receiving said DCH frames, the adaptive receive window comprises a starting point, denoted ref, and an end point for receiving a next DCH frame or a next set of DCH frames to be combined having a Connection Frame Number n, CFN_n, based on the Time of Arrival, ToA, of a previous frame or a previous set of frames having a CFN_{n-1}, and means for adjusting the adaptive receive window by changing its end point for a new frame or a new set of frames in accordance with the estimated size.

2. The DHO node according to claim 1, wherein the receive window has an allowed minimum size.

3. The DHO node according to claim 1, wherein the end point of the adaptive receive window for DCH frame n or set of DCH frames n is set to a time distance of M from a latest expected ToA of DCH frame n or set of DCH frames n.

4. The DHO node according to claim 3, wherein the M is adaptive and is depending on the estimated size of the receive window.

5. The DHO node according to claim 1, wherein the size adjustment of the adaptive receive window is controlled by a receive window end advancing step parameter adapted to slowly reduce the size of the receive window when the frame or set of frames arrives before the end of the receive window.

6. The DHO node according to claim 5, wherein the receive window end advancing step parameter is a constant value.

7. The DHO node according to claim 5, wherein the receive window end advancing step parameter is depending on the ToA of the current DCH frame or the last frame of a set of DCH frames when the current

DCH frame or the last frame of a set of DCH frames arrives after the end point.

8. The DHO node according to claim 1, wherein the DHO node comprises means for receiving an initial end point of the receive window from the RNC.

9. The DHO node according to the previous claim, wherein the received initial end point is used as a starting point for a first frame or set of frames to be combined.

10. The DHO node according to claim 1, wherein the DHO node comprises means for preconfiguring an initial end point.

11. The DHO node according to claim 1, wherein the end point of the receive window is extended to an extended end point in order to counteract the speed of the receive window end advancing parameter when DCH frames arrive relatively frequently after the end point but before the extended end point.

12. The DHO node according to any of the previous claims, wherein the specified times are relative times.

13. The DHO node according to claim 1, wherein an initial end point is set to the ToA of the first uplink DCH frame from a macro diversity leg with an added margin d.

14. The DHO node according to claim 3, wherein M is fixed and the DHO node comprises means for receiving M from the RNC.

15. The DHO node according to claim 3, wherein M is fixed and preconfigured.

16. The DHO node according to any of claims 1 or 2, wherein the ToA is being replaced by a Time of Arrival of the Last Frame of a set of frames to be combined and said receive window is being calculated as a common receive window for all legs.

17. The DHO node according to claim 12, wherein the relative ToA is being replaced by a relative Time of Arrival of the Last Frame of a set of frames to be combined and said receive window is being calculated as a common receive window for all legs.

18. A method for executing a macro diversity functionality in a mobile telecommunication system **characterised in** that the method comprises the step of:

-performing an uplink combining of Dedicated Channel, DCH, frames, wherein said step comprises the further steps of:

-*estimating* the size of an adaptive receive window for receiving said DCH frames, wherein the adaptive receive window comprises a starting point, denoted ref, and an end point for receiving a next DCH frame or a next set of DCH frames to be combined having a Connection Frame Number n, CFN_n, based on the Time of Arrival, ToA, of a previous frame or a previous set of frames having a CFN_{n-1}, and

-*adjusting* the adaptive receive window by changing its end point for a new frame or a new set of frames in accordance with the estimated size.

19. The method according to claim 18, wherein the receive window has an allowed minimum size.

20. The method according to claim 18, wherein the method comprises the further step of:

-*setting* the end point of the adaptive receive window for DCH frame n or set of DCH frames n to a time distance of M from a latest expected ToA of DCH frame n or set of DCH frames n.

21. The method according to claim 20, wherein the M is adaptive and is depending on the estimated size of the receive window.

22. The method according to claim 18, wherein the method comprises the further step of:

-*controlling* the size adjustment of the adaptive receive window by a receive window end advancing step parameter adapted to slowly reduce the size of the receive window when the frame or set of frames arrives before the end of the receive window.

23. The method according to claim 22, wherein the receive window end advancing step parameter is a constant value.

24. The method according to claim 23, wherein the receive window end advancing step parameter is depending on the ToA of the current DCH frame or the last frame of a set of DCH frames when the current DCH frame or the last frame of a set of DCH frames arrives after the end point.

25. The method according to claim 18, wherein the method comprises the further step of:

-*receiving* an initial end point of the receive window from the RNC.

26. The method according to the previous claim, wherein the method comprises the further step of:

-*using* the received initial end point as a starting point for a first frame or set of frames to be combined.

27. The method according to claim 18, wherein the method comprises the further step of:

-*preconfiguring* an initial end point.

28. The method according to claim 18, wherein the method comprises the further step of:

-*extending* the end point of the receive window to an extended end point in order to counteract the speed of the receive window end advancing parameter when DCH frames arrive relatively frequently after the end point but before the extended end point.

29. The method according to any of the previous claims 18-28, wherein the specified times are relative times.

30. The method according to claim 18, wherein the method comprises the further step of:

-*setting* an initial end point to the ToA of the first uplink DCH frame from a macro diversity leg with an added margin d.

31. The method according to claim 20, wherein M is fixed and the method comprises the further step of:

-*receiving* M from the RNC.

32. The method according to claim 20, wherein M is fixed and preconfigured.

PCT / SE 2004 / 0 0 0 1 4 4
0 2 -12- 2005

33. The method according to any of claims 18 or 19, wherein the method comprises the further step of:

-replacing the ToA by a Time of Arrival of the Last Frame of a set of frames to be combined and

-calculating said receive window as a common receive window for all legs.

34. The method according to claim 29, wherein the method comprises the further step of:

-replacing the relative ToA by a relative Time of Arrival of the Last Frame of a set of frames to be combined and

-calculating said receive window as a common receive window for all legs.

35. A computer program product directly loadable into the internal memory of a computer within a Diversity Handover node in a mobile telecommunication system, comprising the software code portions for performing the steps of any of claims 18-34.

36. A computer program product stored on a computer usable medium, comprising readable program for causing a computer, within a Diversity Handover node in a mobile telecommunication system, to control an execution of the steps of any of the claims 18-34.